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DARPATech 99

Tactical Mobile Robotics

LTC John Blitch

DARPA/ATO

(703) 696-4464

Jblitch@darpa.mil

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Goal

- Develop portable robotic tools which perform useful tasks that humans *can't*
  - **Negotiate confined spaces / hazards undetected**
  - **Multi-modal sensing: 360x360**
  - **Map complex environments rapidly / completely**
  - **Manipulate complex objects**

System Concept

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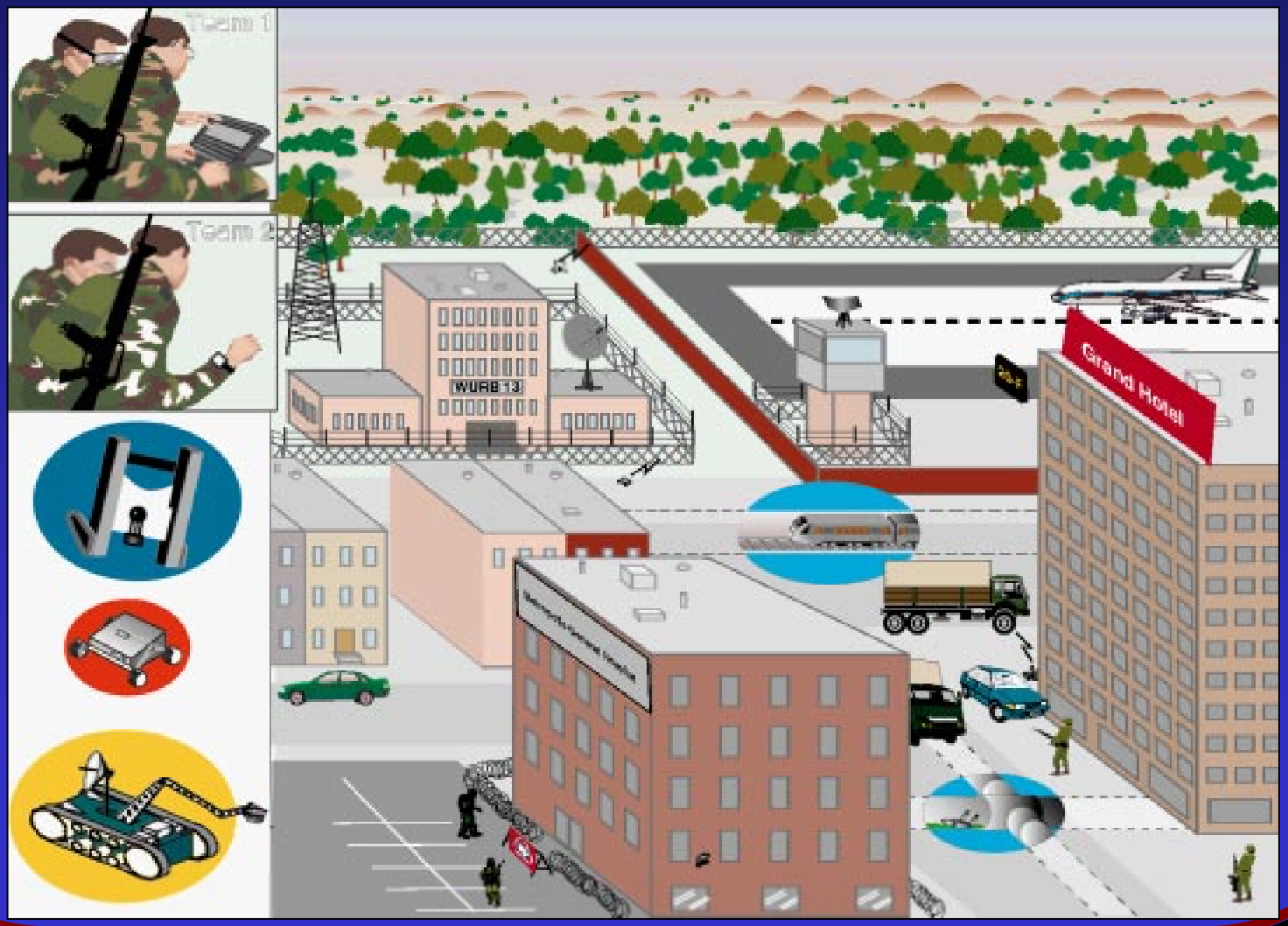

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TMR Time Line

Task	FY98	FY99	FY00	FY01	FY02
Concept Development					
Technology Development					
Platform Design And System Integration					
System Experiments					

Surrogate Robots For Technology Development

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Nomad SuperScout

Sandia Rattler

Foster Miller Lemmings

RWI Pioneer

Technology Goals

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Enabling Technology: *Locomotion*

State-of-the-Art	Goal
• Obstacle avoidance	• Barrier negotiation
• Rigid structures	• Variable geometry
• Horizontal translation	• Adaptive climbing

TMR Progress: Locomotion

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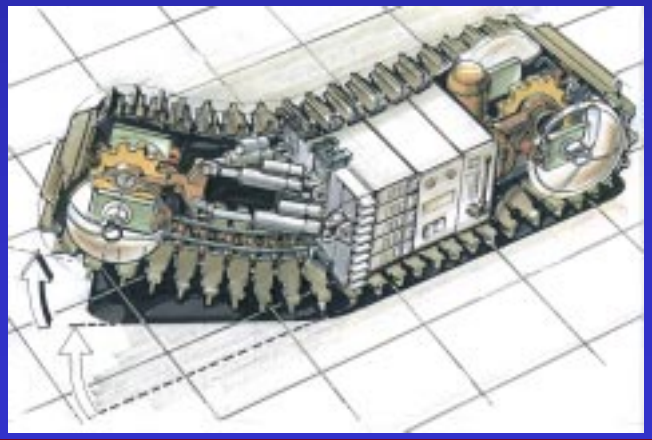

Technology Goals

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Enabling Technology: *Autonomy*

State-of-the-Art	Goal
• GPS/INS waypoint sequence	• Visual servoing
• Info sharing	• Collaborative mobile manipulation
• Cascading systems	• Marsupial operations

TMR Progress: Autonomy

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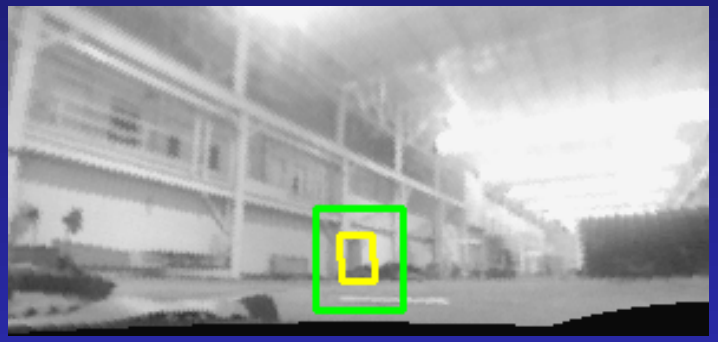

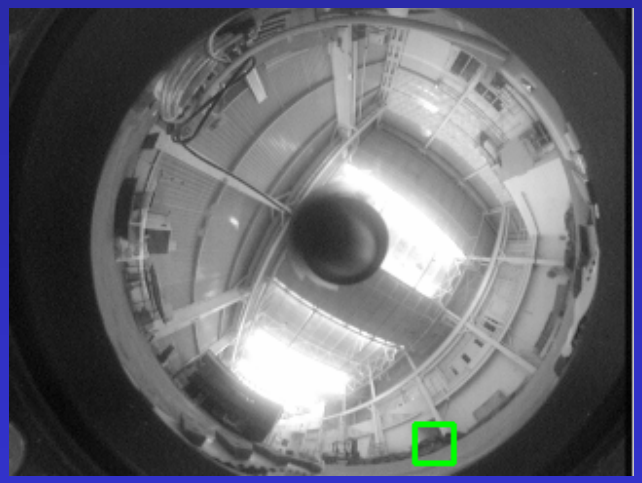

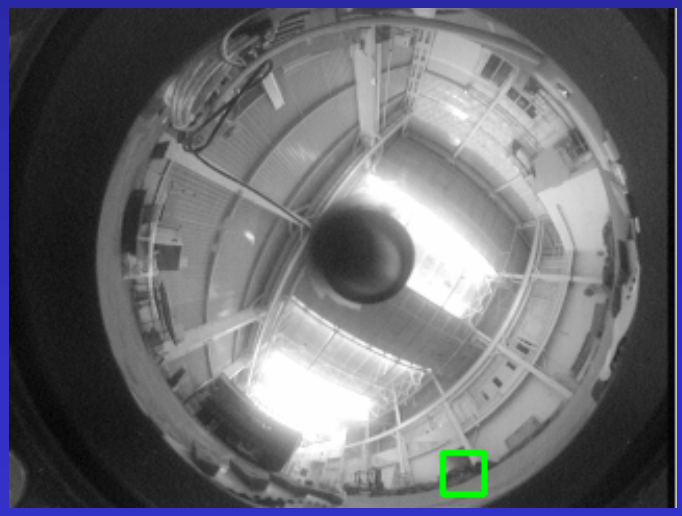

Technology Goals

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Enabling Technology: *Machine Perception*

State-of-the-Art	Goal
• Stereo vision (2 Hz)	• Omni vision
• Sonar, radar, range finders	• Penetrating radar, laser scanners
• Single band imagery	• Multi-band fusion
• Edge detection	• Boundary representation
• Planar image transfer	• Distributed Mapping (3-D)

TMR Progress: Perception

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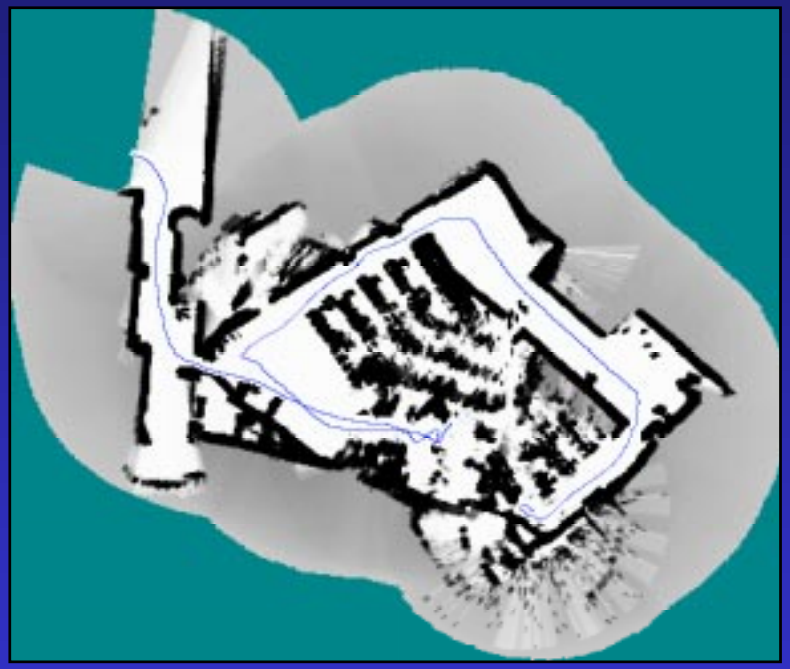
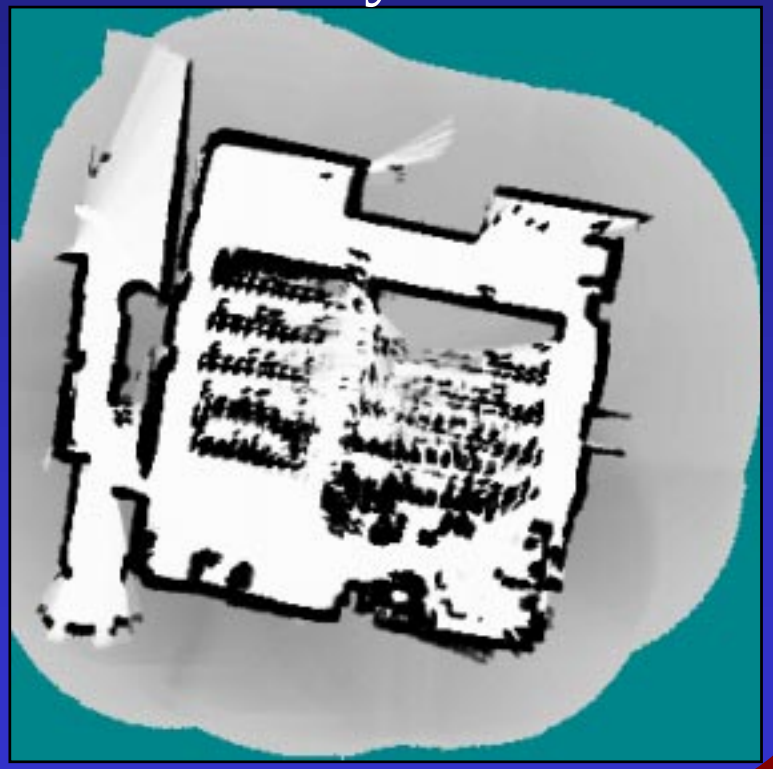


odometry correction



Throw-bot

(Initial Concepts)

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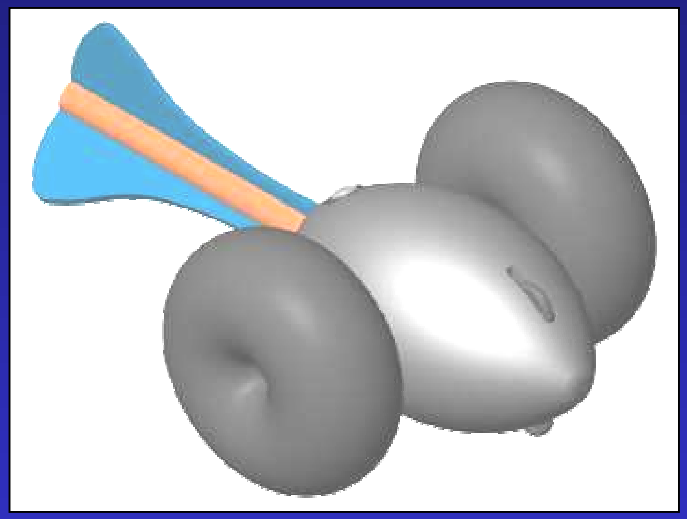

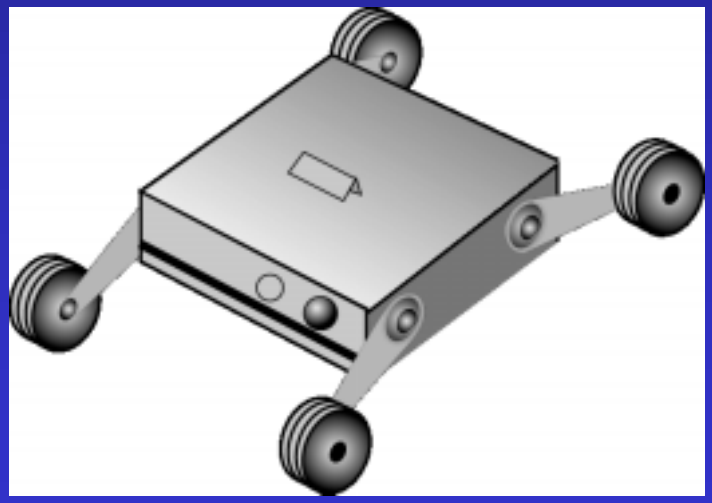

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Systems Integration

- HRI - Human Robot Interface
  - Alert based semi-autonomy
  - Non-distracting gloves, glasses & wearable computer
- CRP - Collaborative Robot Platforms
  - Heterogeneous teaming
  - Marsupial operations

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Future Opportunity

- Innovative Mobility BAA
  - wall climbing, compliant surfaces
  - shape shifting, undulation, hybrids
- Collaboration with OSD Joint Robotics Program